

# Species composition of the terrestrial snails (Mollusca: Gastropoda) from coniferous and alpine areas of the northern Pirin Mountains, Bulgaria

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The fauna of terrestrial gastropods in Bulgaria is relatively well studied; in total, 235 species have been recorded so far (DAMJANOV & LIKHAREV, 1975; DELTSHEV et al., 1993). However, only 16 species of terrestrial gastropods have been recorded in the northern part of the Pirin Mts. This protected highland region is of great faunistic interest because of both the significant portion of endemics and active speciation (DELTSHEV et al., 1993; GUEORGUIEV et al., 1993; HUBENOV et al., 1993).

The aim of the present publication is to add some new information about the species composition and the distribution of the terrestrial gastropods in the northern part of the Pirin Mts.

## Material and methods

The material was collected by the senior author during April - November 1991-1996 in the following localities:

- 1) the Bunderitsa Valley, 1700 m, coniferous forests dominated by *Pinus peuce* Grsb., rendzinas, X 1993, VIII 1994, 21.IV.1995, VIII 1995;
- 2) the vicinities of Bunderitsa Hut, 1770 m, forests of *P. peuce*, rendzinas, VIII 1993, X 1993, VIII 1994, IV 1995, VII 1995, VIII 1995;
- 3) the vicinities of the Baykushevata Mura, 1800 m, forests of *P. peuce*, brown forest soil, open grass terrain, VIII 1993, X 1993, VIII 1994, IV 1995, VI 1995, VII 1995;
- 4) a landslide terrain north to Bunderitsa Hut, 1900 m, a scarce coniferous forest, VIII 1993, X 1993, VIII 1994, IV 1995, VII 1995, VIII 1995;
- 5) glades between Bunderitsa Hut and Vihren Hut, 1900 m, grass and bushes, rendzinas, VIII 1993, X 1993, VIII 1994, IV 1995, VII 1995;

- 6) a high-mountain meadow between Vihren Hut and Mount Vihren, 2300 m, mountainous meadow soil, VIII 1993, X 1993, XI 1993, VIII 1994, IV 1995, VI 1995, X 1995;
- 7) Mount Vihren, 2914 m; scarce alpine vegetation, marbles, VIII 1993, XI 1993, VIII 1994, IV 1995, VI 1995;
- 8) Kazanite Circus, 2100-2500 m, alpine vegetation, marbles, VIII 1993, X 1993, XI 1993, VIII 1994, IV 1995, VI 1995, VII 1995;
- 9) a community of *Pinus mugo*, between Kazanite Circus and Bunderitsa Hut, 1900-2000 m, brown forest soil, X 1993, VIII 1994;
- 10) a slope of Mount Sinanitsa, 2000-2200 m, alpine vegetation, marbles, VIII 1993, X 1993, XI 1993, VIII 1994, IV 1995, VI 1995, VII 1995.

Each locality was visited several times. Most of the snails were collected directly by hand; however, some of them were obtained by sifting of soil. 430 snail specimens were collected altogether. Almost half of them were placed in water to relax and then preserved in 70% ethanol; the rest were collected only as shells. In laboratory conditions, they were studied under stereomicroscope; when necessary, dissections of specimens were carried out.

The works of DAMJANOV & LIKHAREV (1975) and URBANSKI (1978) were used for the species identification.

For the purposes of the zoogeographical analysis, the terrestrial snail species were grouped into four faunistic complexes on the basis of their recent geographical ranges: Holarctic, Western-Palaeartic, Mediterranean and Endemic (JOSIFOV, 1988).

## Results

As a whole 23 species belonging to 19 genera and 12 families were found in the studied areas in the northern part of the Pirin Mts. Their species composition and distribution are presented in Table 1.

Five species are new for the fauna of Pirin Mts. Two more species, previously known from other parts of Pirin Mts. (DAMJANOV & LIKHAREV, 1975), were recorded for the first time in the studied region (Table 1).

The most diverse family is Helicidae (4 species). The families Enidae, Clausiliidae, Vitrinidae and Zonitidae are presented by 3 species. The remaining families are presented only by single species.

The terrestrial gastropods that were found belong to the following faunistic complexes (Table 1):

- the Holarctic Complex - 1 species;
- the Western-Palaeartic Complex - 8 species (among them, 5 species belonging to the European Subcomplex);
- the Mediterranean Complex - 3 species;

Table 1

**Species composition and distribution of terrestrial snails in the northern part of the Pirin Mts.**

The numbers of the localities correspond to those presented in 'Materials and methods'. Abbreviations used for the faunistic complexes (and subcomplexes in parentheses): H - Holarctic, WP - Western-Palaeartic, M - Mediterranean, En - Endemic (Eu - European sub-complex within Western-Palaeartic Complex; P - subcomplex of species endemic for the Pirin Mts., BHE - subcomplex of species endemic for Balkan Highlands; BE - Balkan Peninsula endemics). \* - the first record for the studied region, \*\* - the first record for the Pirin Mts.

Taxa	Specimens	Localities	Altitude (m)	Faunistic complex
<b>Pleurodiscidae</b>				
<i>Pyramidula rupestris</i> (Draparnaud, 1801)	3	5	1800	WP
<b>Orculidae</b>				
<i>Orcula dolium</i> (Bruguiere, 1792)	6	3,5	1900	M
<b>Vertiginidae</b>				
<i>Truncatellina cylindrica</i> (Ferussac, 1821)	1	3	1850	M
<b>Enidae</b>				
Eninae				
** <i>Ena obscura</i> (Muller, 1774)	1	4	1900	WP
<i>Zebrina detrita inflata</i> (Kobelt, 1877)	51	2,3,4,5,8	1770-2500	En(BE)
Chondrulinae				
<i>Chondrula tridens</i> (Muller, 1774)	56	3,4,5	1900	WP
<b>Cochlicopidae</b>				
** <i>Cochlicopa lubricella</i> (Porro, 1838)	2	2	1750	WP(Eu)
<b>Clausiliidae</b>				
<i>Macedonica marginata</i> (Rossmassler, 1835)	1	5	1900	En(BE)
<i>Macedonica marthae</i> Sajo, 1968	8	10	2200	En(P)
<i>Idyla castalia boschi</i> Nordsieck, 1973	26	3,4,5,8,9	1900-2200	En(P)
<b>Vitrinidae</b>				
<i>Vitrina pellucida</i> (Muller, 1774)	23	2,3,5	1800	H
<i>Eucobresia diaphana</i> (Draparnaud, 1805)	1	6	2300	M
* <i>Phenacolimax annularis</i> (Studer, 1820)	4	6	2300	M
<b>Zonitidae</b>				
* <i>Vitrea bulgarica</i> Damjanov et Pinter, 1969	1	5	1900	En(BHE)
** <i>Vitrea sturanyi</i> (A. Wagner, 1907)	10	3	1750	En(BE)
** <i>Oxychilus depressus</i> (Sterki, 1880)	4	4	1990	WP(Eu)
<b>Bradybaenidae</b>				
** <i>Bradybaena fruticum</i> (Muller, 1774)	1	2	1770	WP(Eu)
<b>Helicodontidae</b>				
<i>Lindholmiola corcyrensis pirinensis</i> Jaeckel, 1954	32	5	1900	En(BHE)
<b>Hygromiidae</b>				
<i>Helicella macedonica</i> Hesse, 1828	78	2,3,4,5	1770-1990	En(BHE)
<b>Helicidae</b>				
Ariantinae				
<i>Helicigona trizona haberhaueri</i> (Sturany, 1897)	7	1,2,4	1700	En(BHE)

Table 1 (continuation)

Taxa	Specimens	Localities	Altitude (m)	Faunistic complex
<i>Helicigona polinskii</i> (A. Wagner, 1927)	95	6,7,8	2200-2914	En(P)
<i>Helicigona sztolcmanii</i> (A. Wagner, 1927)	9	8	2100-2500	En(P)
Helicinae				
<i>Helix pomatia</i> Linnaeus, 1758	6	5	1900	WP(Eu)

the Endemic Complex - 11 species (4 endemics for the Pirin Mts, 4 Balkan Highland endemics and 3 Balkan Peninsula endemics).

The species complex of the coniferous forests situated along the valley of the river Bunderitsa (localities No. 1 and 2) includes 6 species: *Zebrina detrita inflata*, *Cochlicopa lubricella*, *Vitrina pellucida*, *Bradybaena fruticum*, *Helicella macedonica* and *Helicigona trizona haberhaueri*. Three of them are endemics (2 Balkan Highland endemics and 1 Balkan Peninsula endemic), 1 belongs to the Holarctic Faunistic Complex and 2 are Western-Palaeartic species.

The species complex of the coniferous forests situated on slopes (localities No. 3) and 4) contains 11 species: *Orcula dolium*, *Truncatellina cylindrica*, *Ena obscura*, *Zebrina detrita inflata*, *Chondrula tridens*, *Idyla castalia boschi*, *Vitrina pellucida*, *Vitrea sturanyi*, *Oxychilus depressus*, *Helicella macedonica* and *Helicigona polinskii*. Three of them are Western-Palaeartic species (among them, 1 European species), 5 are endemics (2 Balkan Peninsula endemics, 1 Balkan Highland endemic and 2 Pirin Mts. endemic), 2 Mediterranean and 1 Holarctic species.

Eleven species were recorded in the glades situated in the belt of coniferous forests (locality No. 5): *Pyramidula rupestris*, *Orcula dolium*, *Zebrina detrita inflata*, *Chondrula tridens*, *Macedonica marginata*, *Idyla castalia boschi*, *Vitrina pellucida*, *Vitrea bulgarica*, *Lindholmiola corcyrensis pirinensis*, *Helicella macedonica* and *Helix pomatia*. Six of them are endemics (3 Balkan Highland endemics, 2 Balkan Peninsula endemics and 1 Pirin Mts. endemic), 3 are Western-Palaeartic (among them, 1 are European species), 1 is Mediterranean and 1 is a Holarctic species.

In the subalpine formations of *Pinus mugo* (locality No. 9), only 1 species has been recorded, *Idyla castalia boschi* (a Pirin Mts. endemic).

The high-mountain meadows above the upper border of forests (locality No. 6) exhibit a complex of 3 species: *Eucobresia diaphana*, *Phenacolimax annularis* and *Helicigona polinskii*. These are 1 Western-Palaeartic (European) species, 1 Mediterranean and 1 endemic for the Pirin Mts.

The highest alpine zone with scarce vegetation (localities No. 7, 8 and 10) is characterized by a complex of 5 species: *Zebrina detrita inflata*, *Macedonica marthae*, *Idyla castalia boschi*, *Helicigona polinskii* and *H. sztolcmanii*. All of them are endemics (4 Pirin Mts endemics and 1 Balkan Peninsula endemic).

*H. polinskii* is very abundant between 2400 and 2914 m at Vihren Mt.; its abundance increases gradually with the altitude. *Macedonica marthae* occurs mainly around Sinanitsa Mt. but with moderate abundance.

In localities No. 3 and 5, the typical concentrations of *Helicella macedonica* and *Zebrina detrita inflata* (see HUDEC & VASATKO, 1971) were observed.

## Discussion

The present study revealed a rather diverse species complex in the northern part of Pirin Mts. As was already mentioned, previous studies have reported 16 species (URBANSKI, 1964; HUDEC & VASATKO, 1971; 1973; DAMJANOV and LIKHAREV, 1975; DELTSHEV et al., 1993). Twelve of them were also found in the course of the present study. The following taxa were not found in the present material: *Limax carbonarius* O. Boettger, 1885 (reported by WAGNER, 1934), *Deroceras agreste transcaucasicum* Hudec et Vasatko, 1971 (reported by HUDEC and VASATKO, 1971), *Idyla castalia pirostoma* (Boettger, 1880) (reported by Jaeckel, 1954; cited after DAMJANOV and LIKHAREV, 1975). Eight species were found in the course of the present study in addition to the previously reported species. Therefore 26 species-group taxa altogether are known to occur in the studied region.

Two subspecies of *Helicigona polinskii*, *H. p. polinskii* (A. Wagner, 1927) and *H. p. pirinensis* (A. Wagner, 1927), have been reported for the Pirin Mts (DAMJANOV & LIKHAREV, 1975). URBANSKI (1964) observed that the specimens collected near the Vihren Mount exhibited the characteristics of the two subspecies. He also believed that *Helicigona polinskii* is a very variable species. This opinion has been also confirmed by the present study. Specimens exhibiting characters of the former or the latter subspecies were recorded always together in the same localities. In addition, specimens with intermediate characters were also found. The examination of the genital system of specimens belonging to the two forms did not reveal any differences. Therefore, the differentiating characters used to distinguish the two subspecies demonstrate more or less individual variants within the same population. On this basis, we recognise *H. p. polinskii* and *H. p. pirinensis* as synonyms.

Compared with the previous data (DAMJANOV & LIKHAREV, 1975), some taxa were recorded at higher altitude. These are: *Orcula dolium* (found at 1900 m versus 1200 m), *Truncatellina cylindrica* (at 1850 m versus 1000 m), *Chondrula tridens* (1900 m versus 1200 m), *Cochlicopa lubricella* (1750 m versus 1300 m), *Bradybaena fruticum* (1770 m versus 1200 m) and *Helix pomatia* (1900 m versus 1300 m).

The comparison of the species composition of terrestrial gastropods in the various plant communities exhibits considerable variations in their diversity. The coniferous forests studied possess greater species richness; however, these are

mainly species with wider distribution (Holarctic, Western-Palaeartic and Mediterranean). The part of the Pirin Mts. endemic taxa in these forests is very small; among them, a two species are endemics for the Pirin Mts. In contrast, the part of endemics in the alpine zone is very high, although it is characterized by 5 species only; among them, 4 endemic taxa for this mountain.

The comparison of the species composition in the various plant communities also confirm JOSIFOV (1982) view, according to which the coniferous belt acts a specific filter that does not permit the penetration of Mediterranean species into the high-mountain areas. There is a single exception: *Phenacolimax annularis* has been recorded in the high-mountain meadows (locality No. 6). However, this species, although recognized as an element of the Mediterranean Faunistic Complex, has a restricted distribution in the high mountains only (Pyrenean Mts, Alps, Balkan Highlands, Crimea, Asia Minor, Caucasus and Central Asia) after DAMJANOV and LIKHAREV (1975).

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# Видов състав на сухоземните охлюви (Mollusca: Gastropoda) от иглолистната и алпийската зона на Северен Пирин

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( Р е з ю м е )

През периода 1991-1996 бяха събрани 430 екземпляра сухоземни охлюви в иглолистната и алпийската зона на Северен Пирин. Бяха намерени 23 вида, принадлежащи към 19 рода и 12 семейства. Нови за Пирин са *Epa obscura*, *Cochlicopa lubricella*, *Vitrea sturanyi*, *Oxychilus depressus* и *Bradybaena fruticum*. Намерените видове принадлежат към следните фаунистични комплекси: холарктичен - 1 вид, западнопалеарктичен - 8 вида (от тях 5, принадлежащи към европейския подкомплекс), медитерански - 3 вида, ендемични - 11 вида (4 пирински, 4 планинско-балкански и 3 балкански ендемита). Най-високото видово богатство е отчетено в иглолистния пояс, но относителният дял на ендемитите е малък. Алпийската зона се характеризира с висок процент на ендемизъм (40% от всички и 100% от пиринските ендемити). Беше установено, че видовете *Helicigona polinskii polinskii* (A. Wagner, 1927) и *H. polinskii pirinensis* (A. Wagner, 1927) не са самостоятелни подвидове и белезите, използвани за различаването им са индивидуални вариации в рамките на една популация.